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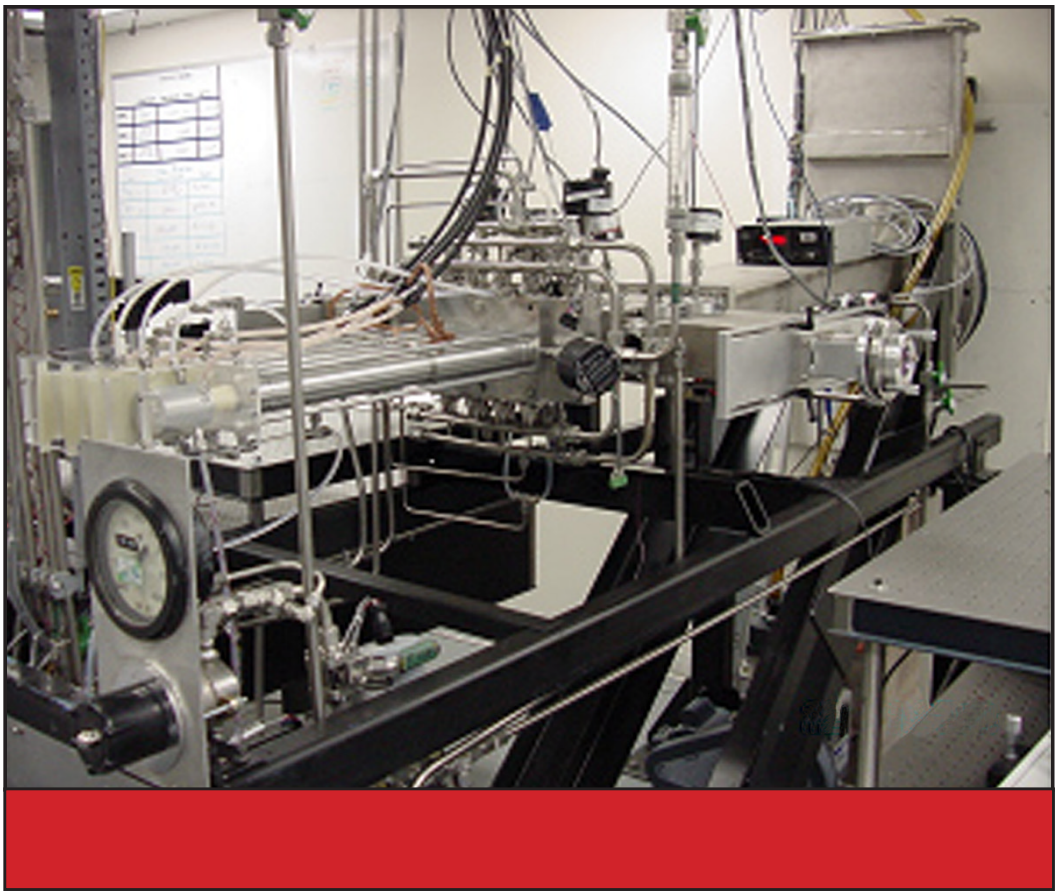
Success Story

DIRECTED ENERGY DIRECTORATE INVENTS NEW ALL GAS LASER



Researchers in the Directed Energy Directorate's High Power Gas and Chemical Laser Branch have worked on the All Gas-phase Iodine Laser (AGIL) project for the past five years. They believe this laser may have the potential for use in the Airborne Laser and Space-Based Laser programs.

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Accomplishment

The directorate designed AGIL to be more versatile than the Chemical Oxygen Iodine Laser (COIL) invented by the directorate in 1977. In particular, this new laser is potentially lighter in weight, operational in zero gravity environments and, because it is a purely gas phase reaction laser, will have a built-in heat rejection via its exhaust. The COIL was the first continuous wave electronic transition chemical laser. AGIL is the first continuous wave electronic transition chemical laser invented since then and, because of its gaseous form, Air Force officials believe it will have more utility.

Background

The directorate's all gas-phase chemical laser, AGIL, creates its light by combining two specific gases—nitrogen chloride (NCl) and atomic iodine. AGIL's laser light results when electronically excited NCl transfers its energy to atomic iodine (I) and then releases the energy in the form of infrared light.

A series of reactions involving chlorine atoms and hydrogen azide generates the electronically excited NCl. Most chemical reactions do not produce electronically excited products; the reaction that produces the excited NCl is a rare exception.

As the excited I atom relaxes back to its ground state, it produces a photon of light in the near-infrared region of the electromagnetic spectrum (1.3 microns). A relatively dilute mixture of NCl and I is capable of generating enough light to produce a low-power laser.

Directed Energy
Emerging Technologies

Additional information

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